

PATENT
Customer No. 22,852
Attorney Docket No. 5788.0391-00000

IN THE CLAIMS:

Please cancel claims 1-24 without prejudice or disclaimer, and substitute new claims 25-48 therefor as follows:

Claims 1-24 (Cancelled).

25. (New) A tuneable laser system configured to emit output radiation on a single longitudinal mode at a laser emission frequency, comprising:

an external cavity having a physical length and a plurality of cavity modes;
a gain medium to emit an optical beam into the external cavity;
a channel allocation grid element being arranged in the external cavity to define a plurality of pass bands substantially aligned with corresponding channels of a selected wavelength grid, the pass bands having a bandwidth at full-width half maximum (FWHM); and
a tuneable element arranged in the external cavity to tuneably select one of the pass bands so as to select a channel to which to tune the optical beam,
wherein said physical length of the external cavity is not larger than 15 mm and the bandwidth FWHM of the channel allocation grid element is 2 to 8 GHz.

26. (New) The laser system according to claim 25, wherein the bandwidth of the channel allocation grid element at FWHM is 3 to 6 GHz.

27. (New) The laser system according to claim 25, wherein the physical length is not larger than 12 mm.

28. (New) The laser system according to claim 25, wherein the laser emission

frequency is selected on a single cavity mode within a given frequency accuracy which is not smaller than 0.5 GHz and the bandwidth of the channel allocation grid element at FWHM is selected so that the minimum distance between two adjacent cavity modes of the external cavity within the pass bands of the channel allocation grid element is not larger than twice the frequency accuracy.

29. (New) The laser system according to claim 25, wherein the selected wavelength grid has a channel spacing of 25 to 50 GHz.

30. (New) The laser system according to claim 25, wherein the selected wavelength grid has a channel spacing of 25 or 50 GHz.

31. (New) The laser system according to claim 25, wherein the channel allocation grid element comprises a Fabry-Perot etalon.

32. (New) The laser system according to claim 31, wherein the Fabry-Perot etalon is placed at an inclination angle of 0.4° to 0.8° to the perpendicular of the optical beam.

33. (New) The laser system according to claim 31, wherein the Fabry-Perot etalon is placed at an inclination angle of 0.5° to the perpendicular of the optical beam.

34. (New) The laser system according to claim 25, wherein the tuneable element has a bandwidth at FWHM of 50 to 250 GHz.

35. (New) The laser system according to claim 34, wherein the tunable element has a bandwidth at FWHM of 50 to 100 GHz.

36. (New) The laser system according to claim 25, wherein the tuneable element

comprises a tuneable mirror placed at one end of the external cavity.

37. (New) The laser system according to claim 36, wherein the tuneable mirror is an electro-optical element that comprises a waveguide formed onto a substrate and a diffraction grating formed onto the waveguide.

38. (New) The laser system according to claim 37, wherein the tuneable mirror further comprises a cladding layer that fills at least the interstices of the diffraction grating, said cladding layer comprising a liquid crystal material.

39. (New) The laser system according to claim 25, wherein the gain medium is a semiconductor laser diode.

40. (New) The laser system according to claim 25, wherein the laser emission frequency is selected on a single transversal cavity mode.

41. (New) A method for controlling a laser emission frequency of a tuneable laser system having an external cavity defining a plurality of cavity modes spaced from each other by $(\text{FSR})_{\text{cavity}}$, the laser emission frequency being selected on a single longitudinal cavity mode, comprising the steps of:

tuning an optical beam emitted from a gain medium to a corresponding centre frequency of a pass band selected from a plurality of pass bands substantially aligned with corresponding channels of a selected wavelength grid element; and

selecting the bandwidth at FWHM of the selected pass band so that

$\text{FWHM} < 2.5(\text{FSR})_{\text{cavity}}$ and

FHWM ≥ 2 GHz.

42. (New) The method according to claim 42, wherein the bandwidth at FWHM of the selected pass band is not larger than 8 GHz.

43. (New) The method according to claim 42, wherein the bandwidth at FWHM of the selected pass band is 3 to 6 GHz.

44. (New) The method according to claim 42, wherein the channels of the selected wavelength grid element have a channel spacing of 25 to 100 GHz.

45. (New) The method according to claim 44, wherein the bandwidth at FWHM of the selected pass band and s_{min} satisfy the following relationship:

$$FWHM = \alpha + \beta \cdot s_{min}$$

where α is -0.8 to -2.7 GHz and β is 1.2 to 2.6.

46. (New) The method according to claim 41, further comprising the step of aligning the laser emission frequency with the selected pass band by adjusting the injection current of the gain medium so as to maximise the laser output power.

47. (New) A method for controlling a laser emission frequency of a tuneable laser system having an external cavity defining a plurality of cavity modes spaced from each other by $(FSR)_{cavity}$, the laser emission frequency being selected on a single longitudinal cavity mode within a given frequency accuracy, comprising the steps of:

tuning an optical beam emitted from a gain medium to a corresponding centre frequency of a pass band selected from a plurality of pass bands substantially aligned with corresponding

PATENT
Customer No. 22,852
Attorney Docket No. 5788.0391-00000

channels of a selected wavelength grid element;

selecting the bandwidth at FWHM of the selected pass band so that it is not larger than $2.5(\text{FSR})_{\text{cavity}}$ and so that the minimum distance between two adjacent cavity modes of the external cavity within the pass band, s_{\min} , is not larger than twice the frequency accuracy.

48. (New) The method according to claim 47, wherein the frequency accuracy is not smaller than 0.5 GHz.